Patent Claims

1. A process for producing a clean liquid from an untreated or crude liquid, in particular for producing fresh water from salt water by means of evaporation of the crude liquid occurring under partial vacuum in an evaporation device (10) and condensation of the vapour in a condensation device (23) connected with the vapour outlet of the evaporation device (10), **characterised in that** the evaporation device (10) and the condensation device (23), in disconnected condition, are filled with crude or clean liquid, respectively, and are subsequently exposed to a partial vacuum created by volume enlargement under hermetically sealed conditions and that the evaporation device (10) and the condensation device (23) are not flow-connected with each other until they are under partial vacuum.

2. A process according to Claim 1, **characterised in that** the crude liquid is heated in a heater (11) and that the vapour is separated in a separator (12) associated with the heater (11).

3. A process according to any of the preceding Claims, **characterised in that** the condensation device (23) is cooled during condensation.

4. A process according to any of the preceding Claims, **characterised in that** the vapour is injected into the condensation device (23) using clean liquid from the condensation device (23).

5. A process according to any of the preceding Claims, **characterised in that** the condensation device (23) is stimulated to perform vibrating movements.

6. A process according to any of the preceding Claims, **characterised in that** the evaporation device (10) is filled from a raw water tank (1) located at a higher level and refilled as and when required.

7. A process according to any of the preceding Claims, **characterised in that** the condensation device (23) is filled from a higher-level clean water tank (20) into which the condensed water is urged due to volume reduction.

8. A device for producing clean liquid from crude liquid, in particular for producing fresh water from salt water, comprising at least one evaporation device (10) which can be supplied with crude liquid and in which a partial vacuum can be produced, and further comprising at least one condensation device (23) which can be supplied with vapour from at least one upstream evaporation device (10) via a connecting line (47), **characterised in that** each evaporation device (10) forms a vessel system comprising a pump unit (3) connected with the bottom area of the evaporation device and having an operating chamber (9) of variable size, which vessel system can be filled with crude liquid when the operating chamber (9) is reduced in size and be exposed to a partial vacuum in hermetically closed condition by enlarging the operating chamber (9), and further in that the side of the condensation device (23) associated with the condensate forms a vessel system comprising a pump unit (25) connected with the bottom area of the evaporation device and having an operating chamber (27) of variable size, which vessel system can be filled with clean liquid when the operating chamber (27) is reduced in size and be exposed to a partial vacuum in hermetically closed condition by enlarging the operating chamber (27), and further in that provision is made in the connecting line (47) for a shut-off device (48) releasing the connecting line (47) only when the operating chambers (9 or 27) are enlarged to maximum size.

9. A device according to Claim 8, **characterised in that** the evaporation device (10) comprises at least one heater (11) and one separator (12) provided downstream of the heater.

10. A device according to Claim 8 or 9, **characterised in that** the vessel system comprising an evaporation device (10) is associated with a raw water tank (1), arranged at a higher level, which is connected with the bottom area of the associated vessel system via a supply line (13), which can be shut off, which vessel system comprises a venting device (19) that extends from the top area of the vessel system and can be shut off.

11. A device according to any of the Claims 8 to 10, **characterised in that** the vessel system comprising the condenser side of a condensation device (23) is associated with a clean water tank (20) located at a higher level, which is connected via a supply line (32), which can be shut off, with the bottom area of the associated vessel system, and with the upper area of the associated vessel system via a discharge line (37) provided with a check valve (38) opening towards the clean water tank (20), with the vessel system comprising a venting device (36), which can be shut off, extending from the upper area of the vessel system.

12. A process according to any of the preceding Claims 8 to 11, **characterised in that** the possible enlargement volume of the operating chamber (27) of the pump unit (25) appertaining to the vessel system on the side of the condenser is larger than the capacity of the associated condensation device (23), preferably more than twice as large.

13. A device according to any of the preceding Claims 8 to 12, **characterised in that** the enlargement volume of the operating chamber (9) of the pump unit (3) appertaining to the vessel system on the side of the evaporator maximally corresponds to the capacity of the separator (12) of the associated evaporator device, and is preferably smaller than that.

14. A device according to any of the preceding Claims 8 to 13, **characterised in that** each of the pump units (3 and 25) comprises a sliding piston (4 and 26) arranged in a cylinder, which sliding piston is connected with a piston (6 and 29) of an equal-stroke drive unit (7 and 30), which latter piston is likewise provided in a cylinder and suppliable with a preferably hydraulic pressure medium.

15. A device according to any of the preceding Claims 8 to 14, **characterised in that** the heater (11) of the evaporation device (10) can be heated directly or indirectly.

16. A device according to any of the preceding Claims 8 to 15, **characterised in that** the heater (11) is designed as a solar collector or in that the heater (11) is associated with a solar collector (52).

17. A device according to any of the preceding Claims 8 to 15, **characterised in that** the heater (11b) is integrated in a heat exchanger (53), the other side of which is designed as a condensation device (23a) of another evaporation device (10a).

18. A device according to Claim 16, **characterised in that** the heat exchanger (53) is designed as a plate heat exchanger.

19. A device according to any of the preceding Claims 8 to 16, **characterised in that** the condensation device (23) is associated with a cooling device, preferably in the form of a sprayer device (39), which cooling device is connected with a cooling water circuit that can be supplied with crude liquid.

20. A device according to any of the preceding Claims 8 to 19, **characterised in that** an injector device (43) is associated with the vapour inlet of the condensation device (23), which injector device comprises a venturi tube (55) whose inner space, which can be supplied

with a clean liquid jet, is connected via inlets (57) provided in the area of a constriction with an annular space (58) which can be supplied with vapour.

21. A device according to any of the preceding Claims 8 to 20, **characterised in that** the condensation device (23) is mounted in an oscillating bearing and connected with a vibration generator (46).

22. A device according to Claim 21, **characterised in that** the condensation device (23) connected with an oscillation generator (46) is on its inlet and outlet lines provided with flexible fittings (62).